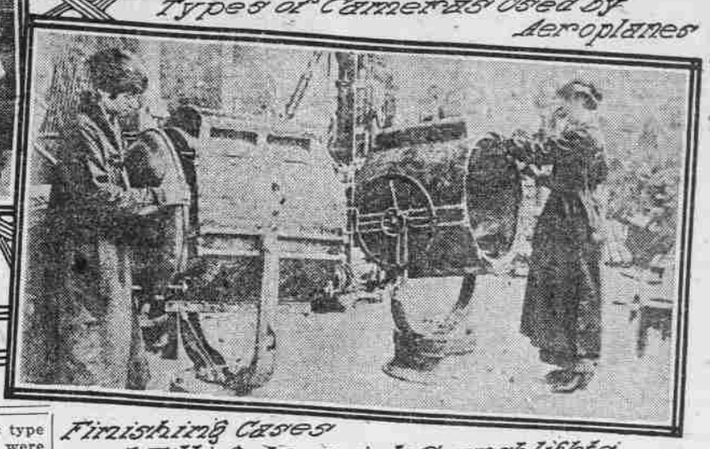
THE LENS IN THE MAKING

Tagging and Registering Some of the Many Thousand "Submarine Hunters" Loaned to the Government © HARRIS & EWING WASH. D.C

Polishing and Finishing Lens for Cameras and Gun Sights

Trying out a Pair of Field Glasses Loaned to the Navy © HARRIS & EWING WASH D.C

Types of Cameras Used by Aeroplanes



Finishing Cases and Fitting Lens into Searchlights

The Part Glass Plays In the Conduct of War – How the Lens Which Helps Save Lives and Win Battles Is Made.

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THE METHODS of the present warfare are largely scientific and mobilization of every industry necessary to its proper conduct is not only a tremendous task, but is efficiently done only after long practical experience. This is what gave Germany her great advantage at the start. Of course, we all know that guns and ammunition must be made, that ships must be built, aeroplanes and automobiles constructed, and that our army must be clothed, but, aside from these, there are many other industries which play a great part in war, industries to which people give little thought when the big things must be considered. One of these is the use of glass in warfare, especially optical glass, such as is needed for binoculars, telescopes, microscopes, photographing, gun sights, periscopes, etc., to say nothing of the lens and mirrors used in searchlights and heliograph apparatus. Even tons of window glass is necessary for windows in cantonments and hospitals. Bottles too for medicines and for serums play their part.

"Made In Germany."

For years the most famous lens for telescopes, field glasses and photographing were made in Germany, and today thousands of these lenses are being used to seek out submarines, as gunsights on our guns and in photographing the German lines and fortifications from our aeroplanes. But there is not enough German lenses in this country to meet our needs, nor is there enough in the allied countries to meet their requirements so each country is manufacturing optical glass on a much larger scale than before the war. It must not be implied that France, England and the United States were unable to produce a good lens before the war, for such was not the case as these countries have for years turned out lenses which were excellent for some purposes, but to meet the exigencies of war the lens must be exceptionally strong and these countries have now set about to put out a lens to meet this requirement, but some time will be required to bring it to perfection.

Early History.

The manufacture of glass is one of our most interesting industries, in fact so interesting that its workings have been shown at almost every large exposition held in this country. The early history of glass making dates back to 4000, B. C., as tombs of the fourth and fifth dynasties show glass blowers at work and glazed beads were found in Egyptian ruins of the same period. Pliny claims that the invention of clear glass making belongs to Syria, and tells how the crew of a ship laden with nitre landed at the mouth of the river Belus. They found no stones on which they could rest their cooking kettle and brought some lumps of nitre from the ship for that purpose. As these were fused with the fine sand a stream of liquid glass flowed out. Whether this is true or merely a legend the fact remains that fine glass was made in this section at an early date. China claims that the manufacture of glass and even optical glass was known there 2000, B. C.

Gradually glass making became known in the various countries of the world, but it was not until the fifteenth century that glass window panes were used in homes. Even then only the rich could afford them and when they left town the glass was taken from the window frames and packed away like jewelry.

Glass makers came to the United States with the Jamestown Colonists, but did not ply their trade until 1621 and then it was to make beads for the Indians. In 1639 a glass maker opened for business in Salem, Massachusetts, but nothing was done on a large scale until 1796 when a big glass making establishment was opened in Pittsburgh, a city which is still an important glass making center. Up to the opening of the present war the United States was still importing her best glass and exporting a cheap quality, the invention of an American, known as pressed glass. While all kinds of glass plays its part in war utilities, it is the optical glass or lens which is an absolute necessity at present.

Optical Glass.

The entire process of making this glass must be controlled with scientific precision. Each kind of glass has its own peculiar composition, and that used for optical purposes having necessarily not only an exceptional transparence and limpidity, but being also obliged to be of two different densities in order to become a chromatic, is composed of what is known as flint glass (ordinary crystals containing lead) and crown glass, sheet glass which in the process of making takes the form of a crown.

The ingredients used in both these types of glass is as follows: Flint glass being composed of sand, minium (oxide of lead) and potash, while crown glass contains sand, potash, salt of soda, chalk and white arsenic. The fusion of optical glass like the whole finishing process requires special care and patience for the slightest deviation from the exact handling may ruin the entire pot of glass. A special furnace and melting pot is used for this purpose. The melting pot lined with broken glass must be heated four or five days before the work begins. The ingredients are put in a certain portion at a time and stirred with a fire clay roller spoon. The mass must be kept at an intense heat for about eight hours, being stirred at certain periods in order to clear it of bubbles. If the stirring is not done at proper intervals and the heating not intense enough the bubbles will remain and the glass be unfit for lenses. Again, if the temperature is too high the clay flaking of the pot falls into the molten mixture and ruins the glass. This process being complete the crucible of glass is put in the annealing oven which is carefully closed, and allowed to cool. The glass is then broken into sections and the perfect ones put into disk shaped clay moulds where they are remelted and shaped to the moulds. After this they are annealed very slowly, the greatest care being used to prevent this from being done too rapidly.

A yield of perfect optical glass amounting to 10 or at most 20 per cent. of the total contents of each pot is all that can be expected and smaller yields serve to explain the relatively high price of optical glass as compared with other varieties of glass. It is very difficult to produce large pieces of perfect optical glass as at times a single fine vein too small to be seen by the naked eye will run through a whole block in such a way that it cannot be removed without cutting up the entire piece.

Binoculars And Microscopes.

The glass used in binoculars and field glasses is somewhat of this type but the methods of making it were discovered long before that of the photographic lens, and is sometimes known as Galileo's glass, because it was believed to have been invented by his genius or perhaps it was by its aid that he discovered mountains in the moon, the satellites of Jupiter and spots in the sun. Binoculars are composed of two of Galileo's glasses fastened together and raised and lowered at will by a screw placed in the center of the hollow tube which separates them and which adheres to the frame work on each side at the bottom.

The microscope too plays its part in war for the Medical Department use numbers of them in their research work and lenses of the finest quality are needed here. Both the simple and compound type are used.

Then there is the lens used in gunsights which must be accurate and requires the most delicate handling. Searchlights and signal lamps require another kind of glass. These are being manufactured in large quantities especially in England where the greater part of the lens fitting is done by women who also make the projector cases.

Thousands of spectacles are used by men in the Army and although each man who wears glasses is provided with a metal case, the life of spectacles in War is very short, consequently there must be a much larger production of eye glass lenses than in normal times.

Great numbers of mirrors are used in periscopes and heliograph apparatus, to say nothing of the tons of common glass used for windows in cantonments and hospitals and of the thousands of bottles used in hospital work.

Mobilizing The Lens Of The Country.

Just now the United States is enlisting utilities as well as men and Uncle Sam has issued a call for binoculars, field glasses and photographic lenses of certain kinds. The binoculars and field glasses are to be used to spy out the deadly submarine which lurks in the war zone and seeks to destroy the lives and property of our citizens. A few weeks ago the Navy Department issued a request to citizens who owned binoculars, field glasses or telescopes to enlist them in the service of the Navy for the period of the war. The Navy was well supplied with glass for ordinary times, but just now every foot of water must be under surveilance when a ship is passing through the danger zone, and there must be a man with glasses to his eyes at every turn as a periscope is likely to appear at any point. The people responded to this call at once and already several thousand glasses have been received and more are arriving every day. It required the work of many clerks to try out and tag these glasses. If they are found unfit for the purpose they are returned to the owner, but if they pass the test each pair has a metal tag containing a number attached to it. This number corresponds with the one beside the name of the owner of the glasses kept on the record. They will be returned to the owner after the war. The glasses received are of every conceivable kind, ranging from the finest binoculars to the tiny telescope and miniature opera glasses.

The photographic lens is called to arms for the purpose of furnishing eyes for the cameras to be used by our airmen. These are being bought outright if they meet the necessary requirements. The Signal Corps especially desires those of the Carl Zeiss Tessar, Goerz Dagmar Bausch and Lomb Ziess Tessar and the Ziess Tessar by Ross of London type. Those of 8½ to 24-inch focal length are greatly needed. Many patriotic photographers who own these kind are letting the bird men have their lens and buying others which will answer quite as well for ordinary work. Quite a number have been received, but not enough to fill the needs of the aviators. As all great military men predict that the war will be won by the power having the best aeroplane equipment, the enlistment of the best lens for the aircraft cameras is especially urged. Already nearly 600 young men photographers are studying at the Government Photographic Aviation School in Rochester, preparing themselves to work the cameras in which these lens will be fitted.

War brings out the best that is in our industries as well as the best that is in our people.

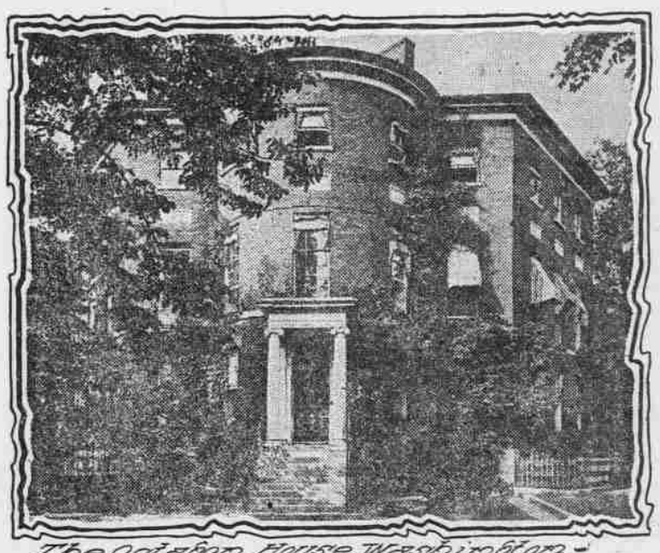
Historic Washington Homes for War Work

Drawing Room in Octagon House, showing Table on which Treaty of Ghent was signed by President Madison – This Room is Now Occupied by Naval Intelligence Board

The Former Homes of Webster and Clay, now the Headquarters of the Committee on Public Information

The Famous Cosmos Club of Washington is Quartered in the "Dolly Madison House"

Department of State War Relief Work Occupies Part of the Old Home of George Bancroft, Historian



The Octagon House, Washington – Madison's Residence and Office after Burning of White House

Uncle Sam Is Using Many Historic Homes Including That of Gideon Welles, George Bancroft, Daniel Webster, Andrew Johnson, John Quincy Adams and Martin Van Buren.

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WITH THE WAR'S PROCLAMATION a year ago everything in Washington changed. The quiet, orderly, peaceful, smiling town with its Government routine, its particular prides and grievances, suddenly threw off its garment of provincial repose, and donning the uniform of militancy, Washington immediately became the capital of a nation at war.

The very stones of Washington are today proclaiming war, for many of the historic old residences, whose function has been to live as largely for sentiment as for utility, have arisen in their might and are opening their doors to the hosts of military workers who are striving to perform the nation's duty.

House In Which Treaty Of Ghent Was Signed.

The building in Washington to which the most vital memories attach is the Octagon house, the mansion built at the instigation of his friend General George Washington, by Colonel John Tayloe, of Virginia. This house was built after the plan of William Thornton, designer of the United States Capitol, and it is one of the finest examples existing today of a colonial house of the eighteenth century. It was the scene of some of the most notable social and political gatherings of the first days of Washington as the Capital, but its prime interest arises from the fact that it was the house to which President James Madison removed the executive residence and offices after the burning of the White House in 1814. During his stay here, the Treaty of Ghent, which closed this country's second war with Britain, was signed by James Madison.

This famous old Washington house was purchased some years ago by the American Institute of Architects, and is used as its headquarters. When war created a shortage of space for the Government's work, the owners of the Octagon house emptied the great drawing room of its historic treasures, including the table on which the Treaty of Ghent was signed, and turned the big apartment over to the Navy Department for the use of its Naval Intelligence Board. The Institute has gone heart and soul into war work and is giving its services freely and widely in the matter of supplying architects and draftsmen for war emergency work.

Beautiful Lafayette Square, around which so many of Washington's historic memories cling, is giving up its old homes to the cause of war's necessity. A tall, white colonial residence of distinction, directly facing the White House, which served as the home of the Naval hero, Commodore Stockton, and later of Slidell of the Southern Confederacy, of Gideon Welles, Secretary of the Navy under President Lincoln, and of many other statesmen of the past, has recently been turned over to the War Department for use as headquarters for its Remount Division.

House Of George Bancroft.

A block to the west of the Welles house is the old home of George Bancroft, the historian, now in part given over to the war relief work of the State Department. Here, almost every day, comes Mrs. Lansing, wife of the Secretary of State, to take actual charge of the making of Red Cross garments and dressings for hospital use.

Admiral Decatur's old home on the southwest corner, and Daniel Webster's handsome residence during the time he served as Secretary of State, on the northeast corner of H street and Jackson place, still stand in this busy section, untouched by war's activities. A few doors below the Decatur mansion, however, the house which sheltered Webster after he had sold his larger property to the late W. W. Corcoran, is now in active use by the Committee on Public Information, whose chief is George Creel. This committee has also taken over one or two other houses in the block, including the home of Henry Clay.

A house of interesting connection situated a few doors above the home of the Committee on Public Information was recently purchased by the National Congress of Mothers and Parent-Teachers Association to serve an admirable war mission. This purpose is that of a club house for enlisted men of the Army and Navy which will be worthy the Capital. The building is spacious and convenient, comfortably and attractively fitted and furnished for the united benefit of the boys in khaki and the boys in blue, to whose comfort and pleasure it is to contribute while they are in camp at or near the Capital, or when they come to it on a brief visit. The chief historic tradition of this house consists in the fact that while the White House was under reconstruction it served the purpose of Executive Mansion to President Roosevelt and his family.

Another residence which served as a "Little White House" during another regime stands directly across Lafayette Park from the new service club and has also been set to purposes of hospitality during the war. This is known as the Tayloe Mansion, because it was built by Benjamin Ogle Tayloe. It later became the home of Senator Don Cameron. It was the residence of Garrett A. Hobart, while he was vice-president, and later, during the McKinley administration, it was occupied by Senator Mark Hanna, through whom it earned its executive title.

This picturesque old house has recently been purchaesd by the Cosmos Club of Washington, its war-time use being to serve as a center of hospitality to a share of the three hundred men of science, literature, art, and those "distinguished in the learned professions or in the public service," who, coming to Washington to lend their aid to the Government of the United States, have been tendered the privilege of associate membership in the famous club. It has undoubtedly added to the interest of these men, as it has given years of gratification to its members, to realize that the main building of the series acquired by the Cosmos Club was the home of President Madison when he left the White House, and the center of extensive hospitality by his wife for a long time after his death, and that it knows no other cognomen in Washington than the "Dolly Madison House."

Historic St. John's, the "Church of the Presidents," situated directly opposite the White House on Lafayette Square, is one of Washington's oldest houses of worship which are contributing their share to the war work of the nation.

United Service Club.

Washington has an historic Army and Navy Club, but like every other institution connected with the War or Navy Departments, the sudden expansion of the nation's fighting forces overtaxed the club, for officers swarmed to Washington too fast to be absorbed by it. To meet this war emergency need, a group of reserve officers conceived the idea of a United Service Club of America, with headquarters in Washington. Secretary of War Baker gave his hearty endorsement to the project and the United Service parent club was opened in Washington, with auxiliaries to follow wherever officers of the Army and Navy are gathered together on this or the other side of the Atlantic.

For their headquarters the officers were fortunate enough to find at their disposal one of the fine old residences of historic prestige. This is the former home of the late James G. Blaine, on Dupont Circle. The spacious house, which was designed by Mr. Blaine and his wife without the aid of an architect, occupies the entire block between P street and Massachusetts avenue, and overlooks the beautiful plot of green sometimes called "Millionaire Circle" from the wealth represented by the residents surrounding it. This house is now owned by George Westinghouse, the Pittsburg millionaire.

Old Adam House.

Among other historic Washington residences which have converted their domestic halls into war-working bureaus is the house at 1623 Pennsylvania avenue which was occupied by Andrew Johnson, while he was vice-president of the United States. The Department of State, which this house faces, is using it as its office of Foreign Trade Advisers.

The Civilian Personnel Division of the War Department makes its headquarters in the Adams Building, at 1333 F street, which has clung to the name of the original building on its site, the Washington residence of John Quincy Adams before he took up his abode in the White House. Directly opposite the street another President, Martin Van Buren, dwelt, and a sturdy little wing of that building yet serves an active purpose of today.

Throughout the whole city of Washington private residences have been given to the use of the Government for overflowing activities, and half a score of apartment houses were summarily emptied of their occupants last fall that they might serve the more pressing official needs of the Army and Navy. The first private dwelling house in the United States to be contributed to the demands of the Red Cross was the spacious mansion of Herbert Wadsworth, which immediately on war's proclamation was offered as headquarters for the District of Columbia, chapter of the American Red Cross.

Another of the more modern Washington houses contributed to the cause of patriotism is the former "playhouse," whose use for the war's duration was generously donated to the Government by its owner, Mrs. Henrietta M. Halliday. This picturesque and attractively furnished building was designed by Colonel J. L. Smithmyer, architect of the Congressional Library. It was placed at the disposal of the Woman's Committee of the Council of National Defense, and is providing comfortable and convenient quarters for the group of women constituting this committee who are giving their services to the country.